

SELF-LIMITED METAL RECESS FOR DEEP TRENCH METAL FILL

Abstract

Disclosed is a method of manufacturing a deep trench capacitor structure that forms a trench in a substrate, lines the trench with a polysilicon liner, and forms titanium nitride columns along the polysilicon liner. The method etches the titanium nitride columns using chlorine-based dry chemistry that is substantially isotropic. This etching process removes the upper portion of the titanium nitride columns without affecting the polysilicon liner. The etching process attacks only in the uppermost portion of the titanium nitride columns such that, after the etching process is completed, the remaining lower portions of the titanium nitride columns are substantially unaffected by the etching process. Then, the method fills the space between the titanium nitride columns and the upper portion of the trench with additional polysilicon material. The process of filling the space simultaneously forms a polysilicon plug and polysilicon cap.